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Widely Received: Payoffs to Player Attributes in the NFL

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Abstract

We examine wide receivers drafted into the NFL to assess what attributes explain draft rank and correspond to high salaries and performance in their first year in the league. We find that tangible measures of player quality are valuable signals. Consistent with expectations, faster and more accomplished college receivers are drafted earlier and earn more. However, we find no significant relationship between 40-yard dash times and first year performance for wide receivers. In addition, media exposure received by players prior to the draft is positively related to draft placement and higher earnings even after controlling for measured physical attributes.

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1. Introduction

In general, successful investing requires the ability to recognize informative signals and ignore unjustified hype. Each year the NFL's draft selection of new players is a risky and costly type of speculative investment. Drafting players for the NFL critically impacts the success of football franchises. As teams decide which players to draft, they take into account not only the players' physical attributes, but also their ability to connect with fans. Since star players will attract fans, we hypothesize that fans' interest in a player is manifest in draft rank, salary, and games played.

We find that a player's media exposure prior to the draft helps to explain variation in both draft rank and first year salary. In addition, tangible measures of player quality are valuable signals of future success. Consistent with expectations, faster and more accomplished college receivers are drafted earlier and earn more. Moreover, media exposure and pre-draft rankings correspond to better draft placement and higher earnings even after controlling for measured physical attributes. This suggests that the media coverage of college players focuses on players' intangible aspects that are also valued by NFL teams.

2. Literature

Previous scholars have explored the relationship between NFL Combine results and NFL performance variables. McGee and Burkett (2003) used the NFL Combine results to forecast which round a player would be selected into based on their performance measurements. Hendricks et al. (2003) used the NFL Draft to show that uncertainty can adversely affect groups that have less reliable indicators of future productivity. They found that teams are more likely to choose a player from a highly visible program in early rounds, while the reverse seemed to be true in later rounds. Their salaries are also less likely to fall with experience, although they do suffer a salary penalty early in their careers.

The literature is divided regarding the issue of whether star players attract fans based on their talent or popularity. Rosen's (1981) analysis of the economics of superstars has generated a body of research that suggests the ability of a star to attract large audiences based on their superior talent is a driving force behind the inequality of rewards. However, Rosen (1981) did not explain the mechanism by which stars emerge. MacDonald (1988) explained the emergence of superstars. Since the quality of a star's performance is observable, an artist can separate themselves from the pack with a series of good performances. Each successful performance attracts larger crowds that are willing to pay higher prices once the uncertainty regarding the artist is minimized. Adler (1985) argues that fans are attracted to more than just an athlete's performance and that fan's appreciation of an athlete's performance increases with the knowledge the fan has about the athlete. Albert (1998) suggests that some athletes become stars because of personality traits that appeal to audiences. According to Adler (2006), coverage in tabloids, magazines, or newspapers is strongly related to popularity, though popularity cannot replace missing talent in Adler's superstar theory.

Several papers have investigated the role of stars in athletics. Lehmann and Schulze (2008) use sport magazine citations to capture the effect of media presence. Brandes et al. (2008) measure star attraction in German Soccer by counting how often star players are mentioned in major German newspapers and magazines. Garcia-del-Barrio and Pujol (2007) define star players as those players with the highest internet exposure. Mullin and Dunn (2002) assert that an athlete's popularity is an intangible characteristic that keep fans coming back even when the athlete is playing poorly. They present evidence that suggests that stars affect team revenues both by on-field success and by their popularity. For a review of the empirical evidence related to the theories of Adler (1985) and Rosen (1981), see Franck and Nüesch (2007).

3. Theoretical & Empirical Framework

In many industries it is vital for companies to exhibit both high levels of performance and a positive public image. Thus, it is not surprising that major corporations and professional sports franchises hire leaders and athletes with proven abilities and media appeal. However, in most settings, it is very difficult for outside observers to assess individual performance. We thus turn to NFL wide receivers for additional insights. Wide receivers have physical abilities that are well-documented, and some are stars. We will use the variation in popularity and ability to draw inferences about each.

We are concerned with how NFL teams value player attributes. To assess this, we provide a simple model that underlies player and team behavior. We believe that players maximize their utility by choosing their optimal level of effort to put toward conditioning and college play. Thus, their efforts – on and off the field – along with their physical and mental abilities combine to determine their performance and popularity as college players. Let PA denote player ability, and E denote effort.

$$PA = g(E) \tag{1}$$

The traits of these players then have the potential to enhance the outcomes of NFL teams. Formally, we assume that players maximize utility by selecting their optimal level of effort. Effort is costly, but it improves performance (and popularity) and may lead to higher future salaries. Similar to Adler (2006), we believe that growth in players' measured abilities (i.e., faster 40-yard dash times for wide receivers) can raise popularity; however, popularity cannot replace missing talent. We assume each player's objective function is given below:

$$\max_{E} U = u(S, E, \Theta) \tag{2}$$

Here S is the individual player's salary; E is effort, and Θ represents idiosyncratic unobservables. Utility is increasing in S and decreasing in E. Salary will be determined based upon the NFL's valuation of the player's performance and abilities, which are derived in part from the player's level of effort.[1]

[1]Conceivably, players might also care about their own performance and popularity per se. These and

NFL teams on the other hand are assumed to maximize profit for their franchises. We assume profits depend upon the team's ability to win games (W), the team's popularity with fans (P), and total salary (TS) expenditures.[2] We further assume that wins are probabilistically determined based upon the team's relative player abilities (PA), relative coaching ability (CA), and the relative strength of the other teams in its division (DS). We assume that the team's popularity with fans depends on franchise history (FH) and also player abilities (PA). Total salary expenditures are assumed to depend on the team's composition of players where attributes like age (A), overall draft position (OP), and player abilities (PA) matter critically. Thus, the following three equations represent the remaining assumptions of the model:

$$W = f_W(PA, CA, DS) \tag{3}$$

$$P = f_P(FH, PA) \tag{4}$$

$$TS = f_{TS}(A, OP, PA) \tag{5}$$

Thus, during the annual draft selection weekend, teams maximize profit by choosing their preferred mix of players, (where abilities and popularity are crucial), and the level of total salary. Thus, NFL team's optimization problem is characterized in the equation below. The league's salary cap is denoted by $\overline{TS}$.

$$\max_{PA,\, TS} \Pi = h(W, P, TS) \text{ s.t. } TS \leq \overline{TS} \tag{6}$$

Now, with regard to drafting new players, teams will select players such that their contributions (of ability and popularity) will increase wins and team popularity. Players will only be drafted if the expected growth in profit will be greater than or equal to their salaries. Since the draft effectively ranks players by their perceived abilities, we can think of teams as jointly choosing salary levels and player attributes. For simplicity, we assume the coaching staff is fixed. Moreover, unlike rare superstar quarterbacks, we assume that wide receivers do not have meaningful bargaining power. Players take their salaries as given dependent on their placement in the draft. Therefore, to improve their NFL salaries and hence individual utilities, players must devote effort to performing well in college and honing their skills at the Combine.

At this point, the model highlights two important factors. First, players supply valuable attributes – and those attributes partly depend upon the effort they put forth. Second, teams compete in the draft "market" for those valuable attributes. Therefore, our empirical estimation will be geared toward understanding which attributes lead players to be drafted earlier, resulting in higher salaries. Finally, we will also examine the extent to which the

any other player-generated outcomes will be incorporated indirectly vis-à-vis salary as long as the NFL also values those outcomes.

[2] All teams in the league face the same salary cap; however, some teams opt not to spend the full amount.

player attributes are directly linked to NFL performance that is likely to result in more wins. For wide receivers, we will consider receptions, games started, and games played.

Since we assume that players are price-takers, their popularity and past performance are exogenous to their draft placement, total salary, and subsequent performance in the NFL. We empirically estimate five reduced-form models. Overall draft pick (OP) is a function of measured player attributes (PA) – including media exposure and physical ability – and other controls; Salary (S), Games Played (GP), and Games Started (GS) are estimated similarly. We also examine the number of Receptions (R) as a function physical ability and other controls.[3]

4. Data

We consider data for prospective NFL wide receivers for the 2001-2006 seasons. College performance, media coverage, offensive characteristics of the team that drafted the player, and NFL Combine results are used to examine salary, overall draft pick, and rookie year performance. Our dependent variables include overall pick in the NFL draft, salary in the first year of the player's NFL career,[4] games played and started in their rookie year, and first year receptions. The set of explanatory variables include media exposure, two dummy variables indicating whether the player competed in a BCS conference in college and whether the player was a Senior upon entering the NFL draft, the number of touchdowns they recorded in their last year of college, their pre-draft ranking among wide receivers, the number of offensive pro-bowlers on the team to which they were drafted, and a competition variable that measures the NFL team's current strength at the wide receiver position by counting the number of players that had over 50 receptions in the previous year of NFL play. Body Mass Index (BMI) and the 40-yard dash times were recorded from NFL Combine results.

The Combine is the equivalent of a job fair for entry-level players designed to help teams estimate the players' value by assessing their health and performance in various drills, tests, and interviews. Significant emphasis is placed on 40-yard dash times for wide receivers because speed can make up for many shortcomings in a prospective player and a superior performance in this area is a signal of athletic prowess and potential. Therefore, the 40-yard dash is the central focus of draft experts and commentators and is generally regarded as a deciding factor in NFL draft status and order.

We explore an unconsidered source of star influence in the NFL Draft: newspaper exposure. To identify the Adler-star effect we measure a player's popularity by counting how often players are mentioned with first and last name in U.S. major newspapers in the year prior to the first day of the draft (LexisNexis). While press citation is only a proxy of a player's popularity, Adler (2006) suggests that publicity in magazines and newspapers is

[3] *Salary* and *News* (our measure of media exposure) are transformed prior to estimation using natural logs since both are heavily skewed.

[4] Salary includes base salary plus signing bonus.

strongly related to popularity. In addition, Brandes et al. (2008) use a similar method to identify star power in German soccer leagues. Since popular players will fill more stadium seats, NFL teams would be wise to pay attention to this type of media coverage.

We define all variables in Table I and provide summary statistics in Table II.

5. Regression Results

The evidence suggests that NFL wide receivers benefit from several factors including media exposure, speed, and past successes on the field (in terms of receptions during their last year in college). Our OLS regressions presented below in Tables III and IV explain a significant amount of the variation in overall draft position and total salary, respectively. It is particularly interesting how powerful the role of media exposure appears to have on draft placement, even after controlling for physical ability and pre-draft rankings. The *ln(News)* variable in Table III has a statistically significant coefficient of -16.41. This essentially means that, for an arbitrary wide receiver, an increase in media exposure of 2 extra articles (in the year prior to the draft) corresponds to moving up 1 full position in the draft.[5] The "pre-draft ranking" among all wide-receivers is also a statistically significant indicator of actual draft outcomes.

Intuitively, the biggest payoffs to receivers come from their speed and catching ability. These are measured by 40 yard-dash times and the quantity of receptions made in the last year of the player's college football career. A one-standard deviation increase in speed (i.e., shedding 0.10 seconds) improves draft position by 12 spots and corresponds to roughly a \$187,000 increase in first year salary. Each additional reception in college improves draft position by about 4 spots, and improves starting salary by 9%, or roughly \$116,000.

Entering the draft 'early' has been controversial in many professional sports, yet no statistically significant differences arise among the wide receivers in our sample.[6] Players from non-BCS conferences were, on average, selected 10 spots later in the draft, but this result is not statistically significant.

Next, Tables V, VI, and VII present regressions that relate observable traits to player performance in the first year in the National Football League. It is apparent that popular, "news-worthy" college receivers start *and* play in more games during their rookie season. This result is statistically significant; however, the magnitudes imply that it requires many news articles to have an impact. Players with one-standard deviation more articles than the average player could expect to play in 2.4 more games and start in 1.5 more games than the average receiver, all else equal.

[5] Two extra news articles is a 5.76% increase from the mean. $(5.76)(-16.41)/100 = -0.95$, or roughly one position better in the draft.

[6] The point estimates suggest receivers entering the draft before their senior season in college tended to be drafted a dozen spots earlier, on average; however, those early entrants did not earn higher salaries or have better rookie year performance.

Interestingly, among drafted wide receivers, raw speed does not increase their number of rookie year starts or games played. However, past performance does matter. Receivers with more touchdown catches in college tend to start more games. There is also evidence that other offensive players on a receiver's drafting team impact his chances of starting. The existence of two additional offensive pro-bowl players diminishes the rookie wide receivers' starts by one game. However, the presence of pro-bowl teammates does not appear to result in significantly lower salaries for rookie receivers.

Finally, in Table VII, we explore the connections between player observables and receptions. Several intuitive results are worth highlighting. Receivers with more prior touchdown receptions in college continue to catch more in the pros. In addition, receivers from non-BCS college conferences tend to catch fewer passes in their rookie seasons. Arguably, this could suggest that players subjected to stiffer competition in college (those from BCS conferences) are better prepared for NFL play, even though on average, they do not play or start in more games than players from non-BCS conferences. Moreover, the team-members' attributes matter for receptions as well. Rookie receivers catch fewer passes when their team has other offensive threats. First-year wide receivers catch roughly two fewer passes for each offensive pro-bowler on their team, and receive three or four fewer passes for each additional teammate that had over 50 receptions in the previous year. These results indicate that rookies, on average, catch less when joining teams that already possess other offensive options.

6. Conclusion

This paper provides new insights into the role of popularity in the labor market for wide receivers in the NFL. We use media exposure to rate the popularity of college football players. We then assess its importance in perceived value (overall draft position), salary determination, and performance. We do this while controlling for physical abilities – including 40-yard dash times – and other team attributes.

By analyzing NFL draft order and rookie salaries we find preliminary evidence of a star effect in the NFL. This is an important finding, as this is the first paper, to the best of our knowledge, to assess the impact of a player's popularity and media exposure on draft order and first year salary. The result also suggests that marketing efforts designed to enhance players' images in the NFL can significantly affect their first year prospects, even after controlling for a host of other performance factors. The result could be especially useful for non-BCS conference players that receive much less television and media coverage than their BCS conference competition.

We find that 40-yard dash times have statistically and economically significant affects on both draft order and salary. Thus, the tremendous emphasis on improving 40-yard dash times is well placed and provides a clear incentive for an athlete to prepare as much as possible for the Combine. However, for the drafted players in our sample, we found that faster 40-yard dash times do not improve first year performance, lead to more games played, or more games started for wide receivers in the NFL. Clearly, other, less tangible variables are at play in determining on field success in a player's rookie year.

Regarding future research, it may be insightful to differentiate between different types of media coverage by contrasting the impact of tabloid and newspaper coverage on NFL salaries and attendance figures. A second avenue of research would explore the root of players' popularity. While our study provides a new link between player popularity and first year success, we do not specifically distinguish between local and national popularity. We cannot currently compare the impact of local news coverage versus nationally syndicated news coverage and therefore cannot distinguish between hometown favorites and national star appeal. Therefore, many aspects of NFL player popularity inquiries remain. Finally, extending our analysis to include the most recent draft data would permit us to determine if the observed trends persist over longer time periods in the NFL and for other player positions.

References

[1] Adler, Moshe. 2006. "The Economics of Superstars: Theories and their Application." In *Handbook of Economics of Art and Culture*, ed. V. Ginsburgh and D. Throsby. Amsterdam: Elsevier.

[2] Adler, Moshe. 1985. "Stardom and Talent" *American Economic Review*, 75(1): 208-212.

[3] Albert, Steven. 1998. "Movie Stars and the Distribution of Financially Successful Films in the Motion Picture Industry." *Journal of Cultural Economics*, 22(4): 249-270.

[4] Brandes, Leif, Egon Franck, and Stephan Nuesch. 2008. "Local Heroes and Superstars: An Empirical Analysis of Star Attraction in German Soccer" *Journal of Sports Economics*, 9(3): 266-286.

[5] Franck, Egon and Stephen Nüesch. 2007. "Avoiding 'Star Wars' – Celebrity Creation as Media Strategy." *Kyklos*, 60(2): 211-30.

[6] Garcia-del-Barrio, Pedro and Francesc Pujol. 2007. "Hidden Monopsony Rents in Winner-Take-all Markets–Sport and Economic Contribution of Spanish Soccer Players." *Managerial and Decision Economics*, 28(1): 57-70.

[7] Hendricks, Wallace, Lawrence DeBrock, and Roger Koenker. 2003. "Uncertainty, Hiring, and Subsequent Performance: The NFL Draft" *Journal of Labor Economics*, 21(4): 857-886.

[8] Kuzmits, Frank E. and Arthur J. Adams. 2008. "The NFL Combine: Does it Predict Performance in the National Football League?" *Journal of Strength & Conditioning Research* (Lippincott Williams & Wilkins), 22(6): 1721-1727.

[9] Lehmann, Erik E. and Gunther G. Schulze. 2008. "What does it Take to be a Star? the Role of Performance and the Media for German Soccer Players." *Applied Economics Quarterly*, 54(1): 59-70

[10] MacDonald, Glenn M. 1988. "The Economics of Rising Stars." *American Economic Review*, 78(1): 155-66.

[11] McGee, K. J. and L. N. Burkett. 2003. "The National Football League Combine: A Reliable Predictor of Draft Status?" *Journal of Strength & Conditioning Research*, 17(1): 6-11.

[12] Mirabile, McDonald P. 2005. "Intelligence and Football: Testing for Differentials in Collegiate Quarterback Passing Performance and NFL Compensation" *The Sport Journal*, 8(2).

[13] Mullin, Charles J. and Lucia F. Dunn. 2002. "Using Baseball Card Prices to Measure Star Quality and Monopsony" *Economic inquiry*, 40(4): 620-632.

[14] Rosen, Sherwin. 1981. "The Economics of Superstars." *American Economic Review*, 71(5): 845-58.

[15] Thornton, Robert J. and Jon T. Innes. 1989. "Interpreting Semilogarithmic Regression Coefficients in Labor Research." *Journal of Labor Research*, 10(4): 443-447.

Table I: Variable Definitions

Variable	Definition
Overall Pick:	The overall pick in the NFL draft. *Source*: National Football League's official website.
News:	Number of times the player appeared in a major newspaper in the year prior to draft day. LexisNexis was used to determine how many stories could be found on a player in the year prior to draft day.
Under:	A dummy variable that takes on a value of 1 if the player entered the draft as a Freshman, Sophomore, or Junior and takes on a value of 0 if the player entered the draft as a Senior. *Source*: individual school websites
Rankb4Draft:	The player's position rank prior to the NFL draft as estimated by NFL-DraftScout.com.
BMI:	Body Mass Index. *Source*: NFL Draft scout
Height:	Player's height in inches. *Source*: NFL Draft scout
Offpb:	The number of offensive pro-bowlers on team player actually played for in first year. *Source*: National Football League's official website
TDCollege:	Number of touchdowns player had in last year of college play. *Source*: Individual college sites.
Competition:	Number of players that had over 50 receptions in the previous year of NFL play on the team that drafted player of interest. *Source*: National Football League's official website
D40:	40 yard dash time in seconds. *Source*: NFL Draft Scout. NFL-DraftScout.com uses the best verifiable 40-yard time for each player. There is no single, official 40-yard time for any player, even those who run at the Indianapolis Combine.
NBCS:	A dummy variable taking on a value of 1 if the player played in a non-BCS conference. BCS conferences include: ACC, Big 12, Big East, Big Ten, Pac 10, and SEC.
Salary:	The actual amount the player received in base salary and bonuses combined. *Source*: USA TODAY's football salaries database contains year-by-year listings of salaries for National Football League players, from the 2000 season through the current season. The data are based on USA TODAY research, information from player agents and NFL Players Association research documents.
Receptions:	Receptions recorded by player in year 1 of NFL play. *Source*: National Football League's official website
Games Played:	Games played by player in year 1 of NFL play. *Source*: National Football League's official website
Games Started:	Games started by player in year 1 of NFL play. *Source*: National Football League's official website

Table II: Summary Statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Overall Pick	161	118.48	74.52	2	256
News	161	34.68	53.68	0	328
Under	161	0.47	0.50	0	1
Rankb4Draft	161	17.14	18.58	1	167
BMI	161	26.69	1.73	22.56	35.34
Height	161	72.76	2.33	66	78
Offpb	161	1.52	1.50	0	6
TDCollege	161	7.32	4.31	0	22
Competition	161	1.52	0.81	0	4
D40	161	4.49	0.10	4.28	4.79
NBCS	161	0.30	0.46	0	1
Salary	148	$1,289,379	$ 1,780,661	$11,611	$10,075,000
Games Played	156	9.49	5.99	0	16
Games Started	156	2.79	4.31	0	16
Receptions	151	14.94	18.52	0	101

Table III: *Overall Pick* Regression (N = 161)

Variable	Coefficient	t-Statistic
ln(News)	-16.41	(-4.57)***
Under	-12.40	(-1.59)
Rankb4Draft	1.66	(7.49)***
BMI	-1.70	(-0.79)
Offpb	3.97	(1.47)
TDCollege	-4.15	(-4.30)***
Competition	3.43	(0.69)
D40	122.67	(3.16)***
NBCS	10.95	(1.10)
Constant	-349.62	(-1.97)*

$\overline{R^2} = 0.61$

* denotes statistical significance at the 10% level;
** denotes statistical significance at the 5% level;
*** denotes statistical significance at the 1% level.

Table IV: Regression of First Year Total NFL Salary, measured in natural logs (N=148)

Variable	Coefficient	t-Statistic
ln(News)	0.37	(6.56)***
Under	0.01	(0.06)
BMI	0.06	(1.76)*
Offpb	-0.07	(-1.49)
TDCollege	0.09	(5.69)***
Competition	-0.16	(-1.98)*
D40	-1.45	(2.31)**
NBCS	-0.21	(-1.24)
Constant	17.02	(5.85)***

$\overline{R^2} = 0.54$

Table V: *Games Played* Regression (Rookie Year Performance) (N=156)

Variable	Coefficient	t-Statistic
ln(News)	1.54	(3.58)***
Under	0.34	(0.36)
BMI	0.22	(0.84)
Offpb	-0.11	(-0.33)
TDCollege	0.17	(1.40)
Competition	-0.02	(-0.03)
D40	1.60	(0.35)
NBCS	1.00	(0.81)
Constant	9.48	(-0.44)

$\overline{R^2} = 0.11$

Table VI: *Games Started* Regression (Rookie Year Performance) (N=156)

Variable	Coefficient	t-Statistic
ln(News)	0.95	(3.33)**
Under	-0.03	(-0.04)
BMI	0.08	(0.43)
Offpb	-0.47	(-2.07)**
TDCollege	0.28	(3.46)***
Competition	-0.22	(-0.56)
D40	3.49	(1.14)
NBCS	-0.72	(-0.88)
Constant	-18.34	(-1.30)

$\overline{R^2} = 0.24$

Table VII: *Receptions* Regression (Rookie Year Performance) (N=151)

Variable	Coefficient	t-Statistic
Under	4.23	(1.57)
BMI	0.12	(0.15)
Offpb	-2.33	(-2.38)**
TDCollege	1.70	(5.31)***
Competition	-3.52	(-2.02)**
D40	11.04	(0.83)
NBCS	-8.87	(-2.95)***
Constant	-41.05	(-0.67)

$\overline{R^2} = 0.24$